THE LEADING EDGE

The Newsletter of the Northern Illinois Rocketry Association May/June 2009

Icarus,
Eat Your Heart Out.

Shuttle Atlantis

Shuttle Atlantis and I.S.S.

THE LEADING EDGE

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The Leading Edge is published bi-monthly for members of the Northern Illinois Rocketry Association (NIRA) NAR Section#117
Dedicated to the idea that rocketry is fun!

Contributors this issue;

Articles	Tony Lentini
	Joseph Diethelm
	Jonathan Chambonneau
Photographs	Rick Gaff,
	Tony Lentini

-T Minus One-

Launch Windows

NIRA Club Launches

July 19	East Branch Forest Preserve
Aug 16	East Branch Forest Preserve
Sept 20	East Branch Forest Preserve

Fox Valley Club Launches

July 11	Kishwaukee Park
Aug 8	Kishwaukee Park
Sept 12	Kishwaukee Park

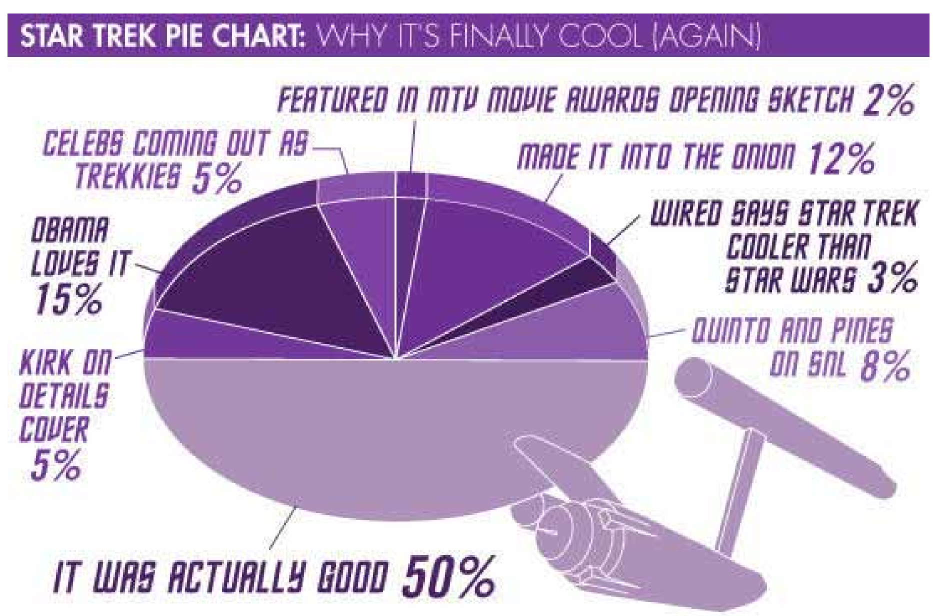
Meeting Calendar

NIRA

July 3	Monthly meeting Helen Plum Library, Lombard
Aug 7	Monthly meeting Helen Plum Library, Lombard
Sept 4	Monthly meeting Helen Plum Library, Lombard

Fox Valley Rocketeers

July 6	Monthly meeting McHenry Public Library
Aug 3	Woodstock Public Library
Sept 8	Monthly meeting McHenry Public Library



Reprinted from "The Onion"

Model Of The Month

May Winner
Joseph Diethelm took the Adult prize again, this time with his scratch designed and built **Dragon.**
There was no Junior or Youth entry.

June Winners
Ian Timberlake returned from college with his **Ragnarok** HPR school project to win Adult.
Junior went to **Joey Charaska** again. Joey showed his fairly well-used **Cici** to good effect.
There was no Youth entry.

Member Profile
Joseph Diethelm

Like most adult rocket builders I started when I was a kid. I built a lot of rocket kits from Estes. Some of my favorites that you may remember were the Red Max, Goblin, and Omega just to name a few. As I built more and more rocket kits I became skilled and fast at it, but also bored with it. I basically felt like I was just doing the same thing over and over again, which is probably why I had quit the rocketry phase of my life.

As a parent of a young child, I wanted to get my son to take an interest in something besides video games, and model rocketry seemed like a good idea. For one, I was familiar with the hobby, and it is a good reason to get my son out of the house and away from the TV. So we started out by building some of the newer almost ready to fly Estes kits. They were easy to build, giving me a chance to teach my son the basics of model rocketry. But like before it did not take long for me to get addicted to rocketry again. My craving to start building again grew fast. So what do I build? I had been out of the game for so long, and only knew of Estes from my childhood. I started searching the Internet for rocket kits, and was surprised to see all the new companies that were out there, and all the new kits there were as well. Rocketry had really changed from when I was doing it years ago. Most of all the size and power. Both have grown, with some rockets that are larger than me, and motors that have more then 4 or 5 times the power then the mighty D engine. (The largest I had back then.) Well, after looking at all the kits that were out there, (and there were many,) I think my favorite is still the Red Max. But after building that one, I did not really find anything that made me feel excited to build, or would be great to have in my collection.

I knew I still had some old rocketry supplies from when I was younger, I just needed to find them. So I did a massive search at my dad's house, and finally found what I was looking for. In a box covered with dust was some of my old supplies and 3 old rockets; the Red Max and two Bomarc rockets, one being the mini size. They were of course old Estes kits that I built over 30 years ago, but what a feeling going down memory lane. The sensation was so wonderful, that I forgot I was in the attic sweating to death from a temperature of about 120 degrees. After I came to my senses, I got down from there with my new found box of memories. I took a closer look at my rockets and discovered that the heat and cold of being in the attic had not been kind to them. The fins on the red max had warped and bent, and the plastic on the Bomarc had become brittle and cracked. But it was still nice to remember back to when I had built and flown them. A simpler life and safer time to be a kid. So I took the box home and went through the miscellaneous rocket parts when my first original idea came to me. How I exactly got there I don't know. Was it from my SCUBA diving or just a picture in my head? But I saw in the box of parts the potential for a shark rocket. Now as you read and see some of the pictures of my rockets you will notice that when I say shark rocket I don't mean a gray rocket with the word shark written on it. I made this first rocket to really look like a shark, with detailed scaling and painting from pictures that I found in my diving magazines. This became my first odd-roc.

Well I now had an idea, next came the hard part. Designing and building something from scratch. The first and hardest thing for me was trying to maintain the characteristics of a shark and yet have it fly. This would soon be a recipe for all my future designs. For some of my ideas, the basic form or subject being made is not too far from a basic rocket design, thus making the project easy. Some are very much outside the basic rocket design criteria, making them a major project to fly right. As for the shark rocket, its basic fin designs are not that bad along with the body shape making it not to difficult to build. I had to omit the forward dorsal fins for flying, so I attach them with velcro and just use them for display. At first this was a problem for me because I wanted the rocket to be complete at all times, but after I tried getting it to fly with them on, I realized there were just too many design problems to do that. So I quickly changed my attitude toward this dilemma and used the velcro after all. I came to the realization that the rockets spend more time on my shelf then they do in the air, and after liftoff you can't tell what it is anyway traveling hundreds of feet in the air. I also started working with clear plexi to make up for fins that are necessary for flight, but are not part of the actual characteristics of the subject being made into a rocket. This shark rocket also has a clear payload section to simulate a shark's stomach. Since they are known as an eating machine, I thought putting a bug in there during flight might be kind of cool for the kids. I am going to rate the difficulty of building this at a 3 out of 5 because of the painting and fin work on it. This is also rated moderate to expert rocket builder. After all this is not a buy off the shelf kit with laser cut fins, all the work has to be done by hand. After all was said and done I realized that this was what I needed to do in the rocketry hobby, I had a great excitement in building and designing my own unique rocket, and as they say the sky's the limit.

Coming up with original ideas is not all that easy. I don't even know where I get all of them. Some just seem to pop into my head, and others I do try thinking about. So from where do I get my inspiration? Some come from personal things that I am into, IE other current hobbies or past ones of mine. The Bowling Pin, Miller Lite Bottle Rocket, gun and tank ammo, and one I like to call "up in smoke". Some came from music like my Beatles Yellow Submarine and the Flying V guitar. While others are from thinking of things that fly, like my Red Dragon, and Witch's broom I call 'Witch Craft'. And last but not least from my son. Rockets like Pikachu, pokeball launcher and Skipper from the Penguins of Madagascar. Wherever they come from, they have been fun to design and build. But the harder ones, or should I say ones that are very much outside the basic rocket design, have had many crashes and subsequent repairs. But it's all worth it in the end. The Ideas for rockets at least for me seem to come in waves, always building the best one first and so on. Some I just have written down on my frig because I haven't figured out a way to actually build them yet. Unfortunately my imagination is too wild for my skills, or at least my ability to make custom unique parts. I also have one I never got to fly right and have abandoned it until I can find something else to make it from.

As with most rocket companies, besides kits you can just buy parts. Some even have designer's kits with miscellaneous parts to build your own designs. I use many of these materials in my rockets, but sometimes my designs usually require something else to fulfill the visual part of the rocket. These are the parts I wish to talk about, and maybe you will find uses for them in your own creations.

For my fish tank rocket, one of my first really different designs, I used part of a two liter soda bottle to simulate the outside glass of a fish tank. It was clear round and large in diameter and worked well for the rocket design. Other materials I have used are clear plastic water bottles, (clear payload for the Stork Express), containers from dairy creamers, (broom section of Witch Craft) foam footballs, (body of Red Dragon) and 16 ounce Miller Lite bottle, (the body of Miller Lite bottle rocket). One of my most used parts is the plastic bowling pin. I used this one first for my bowling pin rocket, and then later in other designs like, world war II paratrooper, football players, and Skipper from the Penguins of Madagascar. I now have gotten into the habit of saving various plastic containers for new designs I may come up with. I use a lot of clear Plexiglas for fins on rocket subjects that have few or no fins at all. They are still noticeable but do hide better than other usable materials. Other materials I have used are felt, pipe cleaners, craft paper, velcro, glitter, cardboard, and straws. And yes if you haven't guessed it already, I may be insane when it comes to the detail of my rockets.

Since all my designs are new they need to be tested for flight. Some need no modification at all; they fly straight and recover well right from the drawing board. Some just need small adjustments, like a slightly larger fin or bigger parachute. I like to think this is because I am such a great designer, but honestly it's not rocket science or is it. I was at a club launch on May 17 2009, and there were many young kids there, maybe from a scout troop. They were all flying a particular model rocket, I am not sure which one, and if I did I probably shouldn't say anyway, but it was one of those almost ready to fly models. Well there must have been about 15 of these rockets and most of them were flown a couple of times. Out of all those flights, I only saw the parachute come out, and fully recover the rocket about two times. Now for a rocket kit that you buy off the shelf that is pretty bad design work. It was a good thing it had plastic molded fins or there would have been a lot of sad and disappointed kids that day. I don't know who screwed the

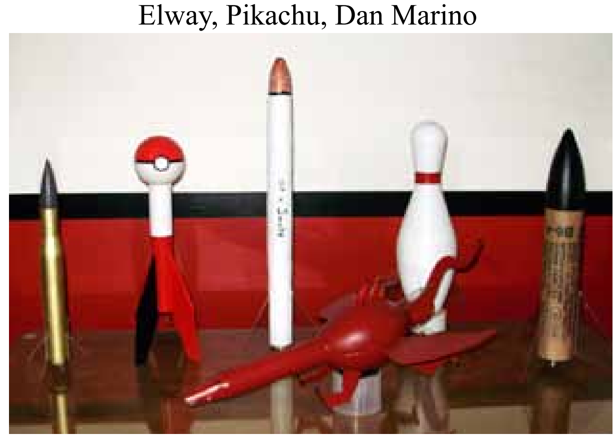
pooch on that design, but if he has an engineering degree he may as well crumple it up and use it for recovering wadding. With all of my new rockets, I have a good or bad feeling about whether or not they are going to fly right. I usually guess right, but have been fooled by a couple. The Flying V guitar, Pokeball launcher, and fish tank were ones that I thought were going to need some modification, but to my pleasant surprise they flew great right out of the gate. One of mine, the yellow submarine to be exact, I thought would do better than it actually did, but it was a disaster the first few times. Eventually I did get it to fly descently. I did learn a valuable lesson on that one; don't finish all the art work until you know if it will fly. The other real hard one was the Red Dragon. I flew that one many times before it flew well, and had many repairs and modifications along the way. But at least I did the art work after getting it flight worthy. I hope you enjoyed reading this as much as I did writing it. I look forward to reading your letters and viewing your rockets, so get off the bench and into the game!
Joseph

Stork express, king tiger tank shell, witch-craft, light saber, galactic police

WWII Paratrooper, Ocean Meets Space, Yellow Submarine, Miller Lite Bottle Rocket, British Bar Dart, Space Robot

Flying V, Walter Payton , Clear Shot, Shark, John Elway, Pikachu, Dan Marino

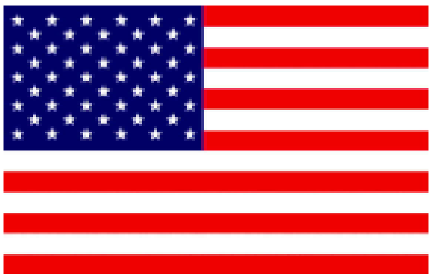
Bud Light Bottle Rocket, Spiderman Bar Dart, Space Pirates, 44 Magnum, Skipper



50 Caliber, Pokeball Launcher, Up In Smoke, Red Dragon, Bowling Pin, Rocket Engine

East

vs.



West

X-20 Dyna Soar
vs.
MiG 105 Spiral

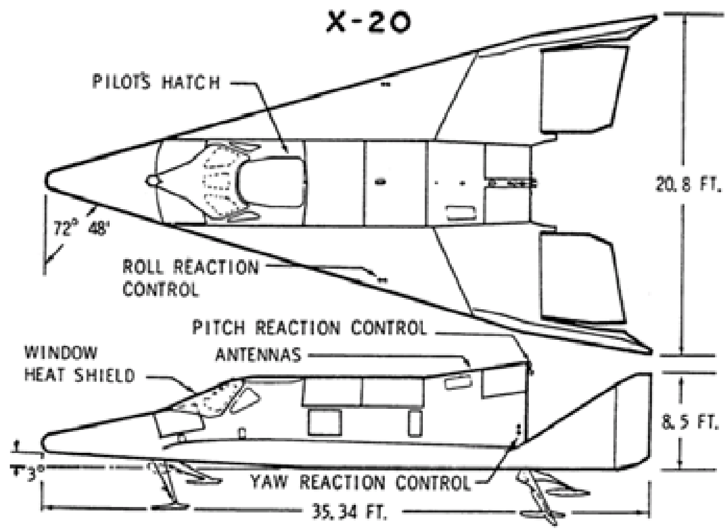
A precursor to the space shuttle, the Dynamic Soarer, or Dyna Soar was conceived by the Air Force to be a reusable spaceplane at a time when NASA was developing the singe use Mercury capsule. Boosting into orbit on a Titan missile, the craft could skip off the atmosphere and was intended to perform reconnaissance or bombing missions, satellite maintenance, or sabotage of enemy satellites. Begun in ‘57, the project ran until ‘63 when it was decided that the craft had no practical mission beyond experimental.

Not to be outdone, the Soviet Union began their own project EPOS for Experimental Passenger Orbital Aircraft. This project began in ‘65, two years after the cancellation of the Dyna Soar, and ran until ‘69. With the birth of the U.S. Space Shuttle program, the EPOS project was re-started in ‘74 and ran until ‘78 when it was cancelled in favor of the Buran Space Shuttle program.

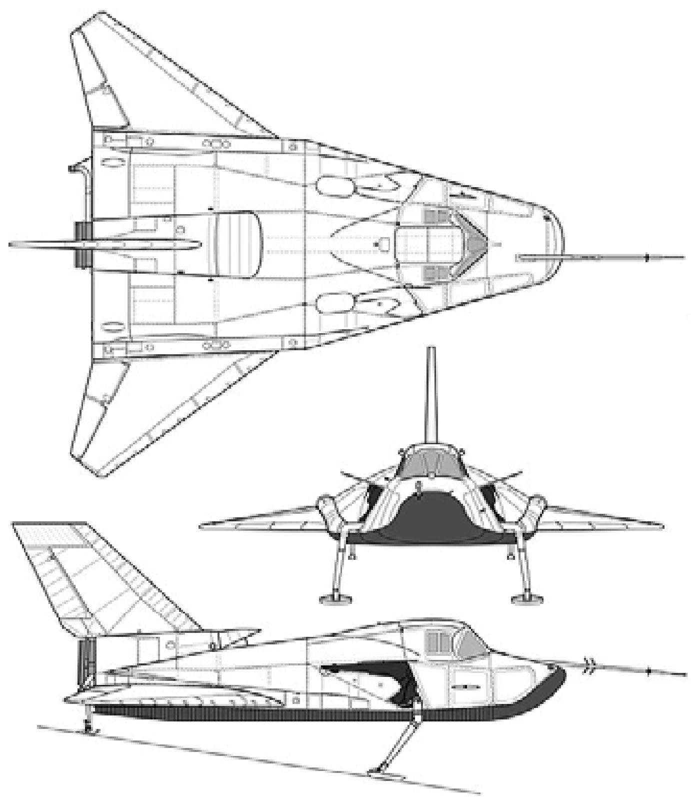
While they had the same mission, the craft had some notable differences. The Dyna Soar was intended to be launched from expendable ICBM’s, the Spiral would be carried on the back of a reusable delta winged mothership to hypersonic speeds, then climb to orbit with the aid of a disposable booster pack.

The Dyna Soar had fixed delta wings and would glide back unpowered. The Spiral had folding wings which would be stowed upward for boost and re-entry, then extended for landing. It also possessed a single turbojet engine allowing it to control it’s atmospheric flight.

Dyna Soar was also intended to have a small cargo bay which could carry a satellite, reconnaissance gear, or even a second pilot. Because of the turbojet engine and fuel tanks, Spiral had no room for any cargo space.



X-20 Dynamic Soarer



MiG 105 Spiral

The Mikoyan-Gurevich MiG-105 "Spiral" was a Soviet project to create an orbital spaceplane. It was originally conceived in response to the American X-20 Dyna-Soar military space project and may have been influenced by contemporary manned lifting body research being conducted by NASA's Flight Research Center in California. It was nicknamed "Lapot" Russian: лапоть, or bast shoe (the word is also used as a slang for "shoe") for the shape of its nose.

The program was also known as EPOS (Russian acronym for Experimental Passenger Orbital Aircraft). Work on this project finally began in 1965, two years after Dyna-Soar's cancellation. The project was halted in 1969, to be briefly resurrected in 1974 in response to the US Space Shuttle Program. The vehicle made its first subsonic free-flight test in 1976, taking off under its own power from an old dirt strip near Moscow. Flight tests, totaling eight in all, continued sporadically until 1978. It was finally cancelled outright, having never flown in space, when the decision was made to instead proceed with the Buran project. The Spiral vehicle itself still exists and is currently on display at the Monino Air Force Museum in Russia.

Although having basically the same mission, Dyna-Soar and Spiral were radically different vehicles. For example: While the X-20 Dyna-Soar was designed for launch atop a conventional expendable rocket such as the Titan III-C or Saturn I, Soviet engineers opted for a midair launch scheme for Spiral. Known as "50/50", the idea was that the spaceplane and a liquid fuel booster stage would be launched at high altitude from the back of a large, airbreathing mothership travelling at hypersonic speeds. The mothership was to have been built by the Tupolev Design Bureau (OKB-156) and utilize many of the same technologies developed for the Tu-144 'Charger' supersonic transport (The Soviet equivalent of the Concorde) and the Sukhoi T-4 mach-3 bomber (somewhat similar to the XB-70 Valkyrie). It never made it off the drawing boards. The U.S. purportedly flew a similar design in the 1990s under the secret Blackstar project.

Dyna-Soar was designed with a fixed, delta-wing planform, while Spiral featured an innovative variable-geometry wing. During launch and reentry, these were folded against the sides of the vehicle at a 60-degree angle, acting as vertical stabilizers. After dropping to subsonic speeds post-reenty, the pilot activated a set of electric actuators which lowered the wings into the horizontal position, giving the spaceplane better flight characteristics.

Spiral was built to allow for a powered landing and go-around maneuver in case of a missed landing approach. An air intake for a single Koliesov turbojet was mounted beneath the central vertical stabilizer. This was protected during launch and reentry by an electric clamshell door, which would open at subsonic speeds. By comparison, Dyna-Soar was designed primarily for a once-off, unpowered deadstick landing, although some documentation claims that its emergency solid-fuel escape rocket (the third stage engine from an LGM-30 Minuteman ICBM) could be used for a go-around maneuver if necessary.

Spiral was designed as a lifting body, while Dyna-Soar was designed more like a conventional aircraft.

High temperature superalloy metals such as columbium, molybdenum, tungsten and rene 41 were to have been used in the heatshield structure of the X-20. Spiral was to have been protected by what Soviet engineers termed "scale-plate armour": individual steel plates hung from articulated ceramic bearings to allow for thermal expansion during reentry. Several BOR (Russian acronym for Unpiloted Orbital Rocketplane) craft were built and launched to test this concept.

In the event of a booster explosion or in-flight emergency, the insulated crew compartment of Spiral was designed to separate from the rest of the vehicle and parachute to earth like a conventional ballistic capsule; this could occur at any point in the flight. Such an escape crew capsule was also considered for Dyna-Soar, but American engineers eventually opted for a solid-fuel escape rocket that would kick the spaceplane away from an exploding booster, saving both pilot and spacecraft.

Much like today's Space Shuttle, Dyna-Soar was designed with a small payload bay behind the pressurized crew module. This could be used for lofting small satellites, carrying surveillance equipment, weapons or even an extra crewmember in a pop-in cockpit. Spiral, on the other hand, appears to have been intended to carry only its pilot. Presumably, this was because the extra space which could have held a payload bay was needed for the Koliesov turbojet and its fuel tanks.

Both Dyna-Soar and Spiral were designed to land on skids. The landing skids on Dyna-Soar were designed to deploy from insulated doors on the underside of the vehicle, like a conventional aircraft. Soviet engineers, most likely concerned about heatshield integrity, designed the landing skids on Spiral to deploy from a set of doors on the sides of the fuselage just above and ahead of the wings. This unusual arrangement resulted in a hard landing on at least one occasion.

Although Spiral itself never made it to the launch pad, it is rumoured that the design was reused and enlarged to build a piloted space interceptor known as "Uragan" (Russian for "Hurricane") in the 1980s. This craft was to have been launched by a Ukrainian-built Zenit expendable booster and was intended to intercept and destroy (if necessary) military Space Shuttle missions launched from Vandenberg Air Force Base. Its armament purportedly consisted of space-to-space missiles.

After the fatal Space Shuttle Challenger disaster prompted NASA and the DoD to cancel all planned launches from Vandenberg, it is said that the Soviet Union had no further need for the craft and, in turn, cancelled the Uragan program.

To this day, Russian officials continue to deny that this craft ever existed, leading some to believe that the purported space interceptor was all part of a successful Soviet disinformation program meant to scare the American military into thinking twice about their plans for the Space Shuttle.

Copied from Wikipedia

The X-20 Dyna-Soar ("Dynamic Soarer") was a United States Air Force (USAF) program to develop a spaceplane that could be used for a variety of military missions, including reconnaissance, bombing, space rescue, satellite maintenance, and sabotage of enemy satellites. The program ran from 24 October 1957–10 December 1963, and was canceled just after spacecraft construction had begun.

Other spacecraft under development at the time, such as Mercury or Vostok, were based on space capsules which returned on ballistic re-entry profiles. Dyna-Soar was much more like the much later Space Shuttle: it could not only be boosted and travel to distant targets at the speed of an intercontinental ballistic missile, but it was designed to glide to earth like an airplane under the control of the pilot. It could land at an airfield, rather than simply falling to earth and landing with a parachute. Dyna-Soar could also reach earth orbit.

This made Dyna-Soar far more advanced in concept than the other human spaceflight missions of the period. Data collected during the X-20 program would prove useful in designing the Space Shuttle. The much larger Shuttle would also be boosted into orbit by large rockets for launch, and the final design would also pick delta wings for controlled landings, but it (and a similar Soviet design, Buran) would not fly until decades after the X-20 cancellation.

The development of Dyna Soar can be traced back to Eugen Sänger's Silbervogel, a German bomber project of World War II. The concept was to create a rocket-powered bomber that could travel vast distances by gliding to its target after being boosted to high speed by A-4 or A-9 rocket engines.

Essentially, these rocket engines would place the vehicle onto an exoatmospheric intercontinental ballistic missile-like trajectory and then fall away. However, when the vehicle reentered the atmosphere, instead of fully reentering, bleeding off its speed and landing, the vehicle would use its wings and some of its speed to generate lift and bounce the vehicle back into space again. This would repeat until the speed was low enough that the pilot of the vehicle would need to pick a landing spot and glide the vehicle to a landing. This use of hypersonic atmospheric lift meant that the vehicle could greatly extend its range over a ballistic trajectory using the same engines.

Following World War II, many German scientists were taken to the United States by the Central Intelligence Agency's "Operation Paperclip". Among them was Dr. Walter Dornberger, the former head of Germany's wartime rocket program, who had detailed knowledge of the Silbervogel project. Working for Bell, he attempted to create interest in a boost-glide system in the USAF, and elsewhere. This resulted in the USAF requesting a number of feasibility and design studies - carried out by Bell, Boeing, Convair, Douglas, Martin, North American, Republic, and Lockheed - for boost-glide vehicles during the early 1950s:

On 24 October 1957, the USAF Air Research and Development Command issued a proposal for a "Hypersonic Glide Rocket Weapon System" (Weapons System 464L): Dyna Soar. The proposal drew together the existing boost-glide proposals, as the USAF believed a single vehicle could be designed to carry out all the bombing and reconnaissance tasks intended for the separate studies, and act as successor to the X-15 research program.

In March 1958, nine U.S. aerospace companies tendered for the Dyna-Soar contract. Of these, the field was narrowed to proposals from Bell and Boeing. Even though Bell had the advantage of six years' worth of design studies, the contract for the spaceplane was awarded to Boeing in June 1959 (by which time their original design had changed markedly and now closely resembled what Bell had submitted). In late 1961, the Titan III was eventually finalized as the launch vehicle. The Dyna-Soar was to be launched from Cape Canaveral Air Force Station.

Besides the funding issues that often accompany research efforts, the Dyna-Soar program suffered from two major problems: uncertainty over the booster to be used to send the craft into orbit, and a lack of a clear goal for the project.

The Titan II and Titan III boosters could launch Dyna-Soar into Earth orbit, as could the Saturn C-1 (later renamed the Saturn I), and all were proposed with various upper-stage and booster combinations. While the Titan IIIC was eventually chosen to send Dyna-Soar into space, the vacillations over the launch system delayed the project as it complicated planning.

The original intention for Dyna-Soar, outlined in the Weapons System 464L proposal, called for a project combining aeronautical research with weapons system development. Many questioned whether the USAF should have a manned space program, when that was the primary domain of NASA. However, it was frequently emphasized by the Air Force that, unlike the NASA programs, Dyna-Soar allowed for controlled re-entry, and this was where the main effort in the X-20 program was placed. On 19 January 1963 the Secretary of Defense, Robert McNamara, directed the Air Force to undertake a study to determine whether Gemini or Dyna-Soar was the more feasible approach to a space-based weapon system. In the middle of March 1963, after receiving the study, Secretary McNamara "stated that the Air Force had been placing too much emphasis on controlled re-entry when it did not have any real objectives for orbital flight".This was seen as a reversal of the Secretary's earlier position on the Dyna-Soar program. Dyna-Soar was also an expensive program that would not launch a manned mission until the mid-1960s at the earliest. This high cost and questionable usefulness made it hard for the Air Force to justify the program. Eventually, the X-20 Dyna-Soar program was canceled on 10 December 1963.

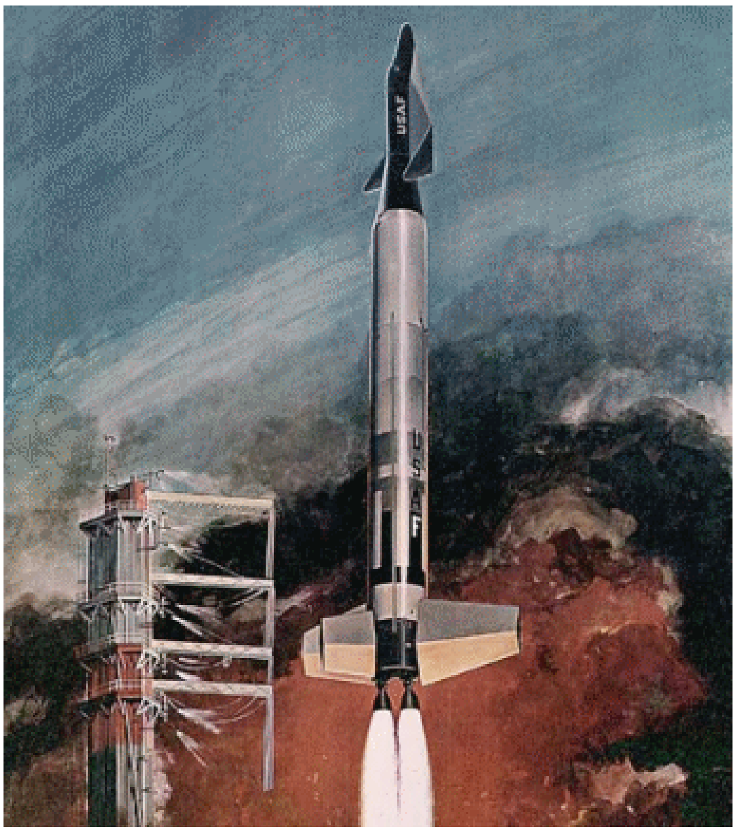
The overall design of the X-20 Dyna-Soar was outlined in March 1960. It had a low-wing delta shape, with winglets for control rather than a more conventional tail. The framework of the craft was to be made from the René 41 "super alloy", as were the upper surface panels. The bottom surface was to be made from molybdenum sheets placed over insulated René 41, while the nose-cone was to be made from graphite with zirconia rods.

Due to the changing requirements, various forms of the Dyna-Soar were designed, but all variants shared the same basic shape and layout. A single pilot sat at the front, while an equipment bay was situated behind. This bay contained either data-collection equipment, weapons, reconnaissance equipment, or (in the X-20X “shuttle space vehicle”) a four-man mid-deck.

After the equipment bay was the transition-stage rocket engine, which was used to maneuver the craft in orbit or fired during launch as part of an abort. This trans-stage would be jettisoned before descent into the atmosphere. While falling through the atmosphere an opaque heat shield would protect the window at the front of the craft. This would then be jettisoned after aerobraking so the pilot could see.
A drawing in Space/Aeronautics magazine from before the project’s cancellation depicts the craft dipping down into the atmosphere, skimming the surface, to change its orbital inclination. It would then fire its rocket to resume orbit. This would be a unique ability for a spacecraft, for the laws of celestial mechanics mean it is much more difficult for a rocket to do this once in orbit. Hence the Dyna-Soar could have had a military capacity of being launched into one orbit and rendezvousing with a satellite even if the target were to expend all its propellant in changing its orbit. Acceleration forces on the pilot, however, would be severe.

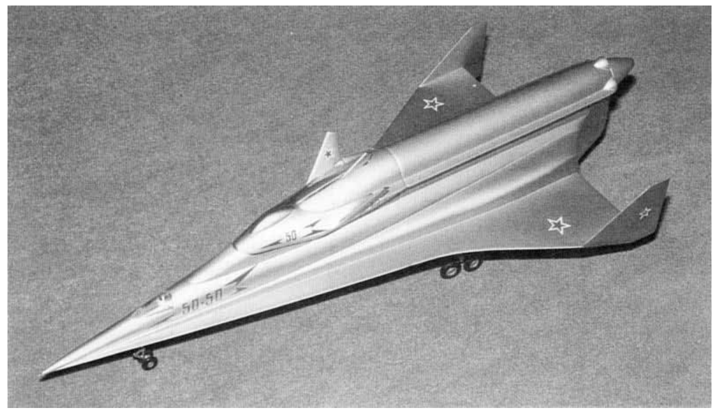
Unlike the later Space Shuttle, Dyna-Soar did not have wheels on its undercarriage as it was thought the rubber would burn during re-entry. Instead Goodyear developed retractable wire-brush skis made of the same René 41 alloy as the airframe.

Copied from Wikipedia



Dyna Soar & Titan Concept Painting

Dyna Soar & 2nd Stage Booster Concept



MiG 105 Spiral & Tupelev OKB-156 Mothershp Concept Model

Spiral and Booster climb away from Mothershp Concept

Astronauts pay respects to 'space chimps'

By John Zarrella CNN
FORT PIERCE, Florida (CNN) —

The chimpanzees could sense something was different. Most days, the only people they see on their island habitats are their caretakers. But on Thursday afternoon, the chimps got a special visit from reporters and camera crews, along with two men who share a unique bond with the animals.

The place was a sanctuary run by Save the Chimps, a nonprofit dedicated to providing a permanent home for chimpanzees rescued from research laboratories, NASA facilities and other sources.

The men were astronauts Scott Carpenter and Bob Crippen, two heroes of the U.S. space program. And the chimpanzees — some of them, anyway — were veterans of early test flights by NASA and the U.S. military.

"We're paying them back for their service," said Carpenter, one of NASA's original Mercury Seven astronauts and the second American to orbit the Earth. He toured the sanctuary with Crippen, who piloted Columbia on the first space shuttle flight in 1981.

The two NASA heroes came to acknowledge the contributions of a group of chimpanzees known as the "space chimps." In the 1950s and early 1960s, the space program, very much in its infancy, used monkeys and chimpanzees to test how space flight would affect the human body. Before Alan Shepard Jr. made his famed first American space flight in 1961, a chimpanzee named Ham completed a successful suborbital flight in a Mercury capsule.

"There were a lot of unknowns back in the '50s about how the human body would react to space and some real bad concerns that you might die," Crippen said. "And these guys opened that up to at least give people confidence that it was OK to go put Al Shepard and the guys up for the first time."
Ham's backup was a chimp named Mini, believed to be the only female chimpanzee trained for the Mercury program. Mini's daughter, Lil Mini, lives at the Save the Chimps sanctuary.

Save the Chimps was established in 1997 in response to the U.S. Air Force's announcement that it was getting out of the chimpanzee research business. The sanctuary first took in 21 of the Air Force space chimps. Besides Lil Mini, there are a handful of other space chimps still there.

According to the sanctuary's records, a chimp named Dana was captured for the Air Force program in the 1960s and used for research, while Marty was used for a "data acquisition flight" in 1965.

Space chimps Gogi and Gromek are here, too. Gogi was used to study the effects of rapid decompression, according to sanctuary records. Gromek was used in studies of the blood. When Gromek came to the sanctuary in 2000, it was the first time he had been out of a cage in nearly 40 years.

The sanctuary is a remote 200 acres divided into a dozen islands. Chimpanzees don't swim, so the water surrounding each island is a natural barrier. In all, there are 150 chimps here. Nearly all the others were used in medical research.
Most chimps lived in laboratory cages until they came to the sanctuary. Now they live in family groups of about 25 to each island, where they roam in enclosures. Several unoccupied islands sit ready for the arrival of another 150 former research chimps that will eventually retire here.

"These guys contributed a lot to where we are at now from a technical standpoint and a scientific standpoint," Crippen said. "It's really nice to give them a nice place to retire."
Carpenter and Crippen toured the facility in golf carts, and some of the chimps jumped and screamed when the carts approached. Others got a kick out of spitting water on visitors who got close to their enclosures.

As the two astronauts drove around, sanctuary staff members pointed out each and every chimp by name.

Carpenter is not sure the chimpanzees proved space flight safe for humans, because a chimp is many times stronger than an adult human male. But from one retired space traveler to another, he appreciates their contributions to space exploration.

"They're capable of withstanding a lot more stress than people are," said Carpenter, who turned 84 on Friday. "But ... it gave us the resolve to press on."

All The News That Fits To Print

Stephen Hawking Builds Robotic Exoskeleton

CAMBRIDGE, ENGLAND—Nobel Prize-winning physicist Stephen Hawking stunned the international scientific community Monday with his latest breakthrough, a remarkably advanced cybernetic exoskeleton designed to replace his wheelchair.

Physicist Stephen Hawking strolls the Cambridge University campus in his new $55 million exoskeleton

Hawking, paralyzed since early adulthood with the degenerative nerve disease ALS, unveiled the new creation at a press conference at Cambridge University.

"I am faster, stronger... better than before," Hawking told reporters via his suit's built-in voice synthesizer.

The hulking, hydraulically powered titanium-alloy exoskeleton is expected to assist the famed *Brief History Of Time* author tremendously in his ongoing theoretical physics research. "With the new exoskeleton, Stephen will be able to safely handle radioactive isotopes in the high-radiation area of the new supercollider particle accelerator. And his new robo-arms are capable of ripping open enemy tanks like they were nutshells," said Cambridge physics chair Sir Geoffrey Neville Shropshire-Kent.

The exoskeleton is also equipped with special infra-vision goggles, which will allow Hawking to observe sub-atomic phenomena firsthand.

"Wait a minute," said Hawking, testing out the high-tech infra-vision goggles for the first time. "I see now that the curvature of space-time follows previously unmeasured vectors that I will need to recalibrate in my equations. Also, there appears to be some sort of trouble on the moon."

Among the suit's other features: laser terminals; oxygen pressure-tanks for deep-sea and outer-space research; jet boots; and the most advanced crime-lab database in the world.

Constructed in Hawking's secret underground headquarters over the last two years by the famed scientist and his orphaned teenage sidekick and research assistant Hawk-Lad, the exoskeleton has already proven invaluable, not only in increasing the paralyzed Hawking's mobility, but in rounding up the notorious international gang of diamond thieves known as "The Fearsome Four."

The $55 million exoskeleton, which Hawking operates through slight movements of his left wrist, is powered by a pair of bio-morphogenetic servo-motors, and boasts the most advanced cyber-robotic technology anywhere, freeing Hawking of the wheelchair in which he has been confined for much of his adult life and giving him greater freedom of movement when engaged in battle.

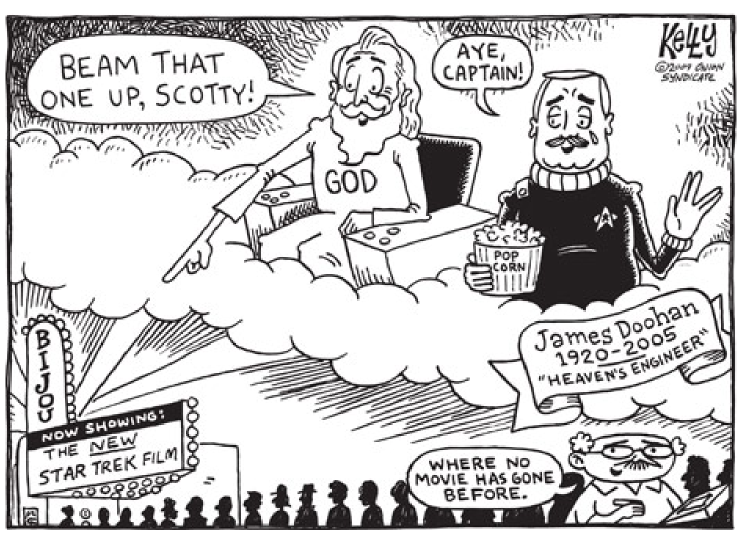
"Beware, would-be evildoers," Hawking said. "My crime-fighting powers are as infinite and unknowable as the very universe itself."

As for the future, Hawking said he plans to continue teaching and hopes to take a sabbatical in Italy with his wife and nurse. But primarily, he will focus on preparing for his greatest mission yet: a descent into a black hole in mid-1998.

"Only by penetrating the event horizon itself will I be able to observe the effects of singularity on neutrino decay and complete my research," Hawking said. "It should also prove invaluable in the construction of my new Anti-Gravity Gun. It may be our only hope for stopping Monstro, The Living Behemoth."

Hawking has already received the International Science League award for his invention, as well as a prestigious chair at the Helsinki Cybernetics Institute. He is also widely regarded as the favorite to win this year's Nobel Prize For Physics, and he recently received an honorary key to New York from Mayor Rudolph Giuliani after saving the city from the Galactons.

Copied from "The Onion"



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Confused Stages
Stage 39

Have you ever wondered how high your rocket went? How high a new or scratch built rocket will fly? Been dogged by complex calculations? Read on, this stage will give methods that are easy to do in practice and are fairly accurate. not enough to use in competition but will yiedla general ballpark result.

Altitude: With just the following data; Engine's burn time, coast time, and gravitational acceleration you can calculate the rocket's altitude. The displacement equasions is;

$$d= 1/2\ at^2+N_0t+d_0$$

d=displacement (distance) a=acceleration
v_0=initial velocity d_0=initial displacement
t=time

The acceleration due to gravity is;
g=9.8m/s2 in metric g=32ft/s2 in english

To determine the coasting altitude gain, multiply the 12g by the square of the coast time (recommended engine's delay time). Multiply the coast time by g to get the burnout velocity. Divide burnout velocity by the engine's burn time (thrust duration) to get average acceleration in powered flight. Multiply half of this acceleration by square of engine's burn time to get burnout altitude. Add burnout altitude to coasting altitude gain for final altitude. Barring any anomalies, this final altitude will be lower than the actual altitude. This is because of the following assumptions. 1. No drag. 2. Gravity being the only other force acting on a rocket.

Because there is aerodynamic drag, the negative acceleration during coasting flight is the sum of g plus drag, and therefore is greater than g. This means the burnout velocity is greater than g times coast time and acceleration during powered flight is greater than g times coast time divide by burn time. This method with the above mentioned assumption is under estimating the engine's acceleration. If you divide the calculated burnout momentum, which is the rocket's mass times it's burnout velocity from above, by the engine's burn time, you'll get a quotient that is markedly less than the engine's average thrust.

t_c=Coast time t_b=Burn time
g=gravitational acceleration
a_p=Average acceleration in powered flight
v_b=Burnout Velocity d_b=Burnout altitude
d_c=coasting altitude gain d_x=final altitude

$d_c=1/2\ g\ t_c^2$ $V_b=g\ t_c$ $a_p=v_b / t_b$

$d_b=1/2\ a_p\ t_b^2$ $d_x= d_b+ d_c$

Momentum (P) = mass of rocket * velocity

Newton's 2nd law: F=ma
F=force m=mass a=acceleration

Assumed average thrust $=m\ v_b / t_b=m\ a_p$

$m\ a_p$ < rated thrust of engines, hence underestimated.

Another way is to multiply the rocket's descent from ejection to touchdown. Divide this time by the time of descent from a know height to get the altitude. Errors in this method arise from variances in air density, and the influence of vertical drafts (thermals).

If you have an Estes Altitrack, you can use the altitude scale with any baseline. At 150 feet, it will show altitudes in feet. At 150 yards, it will show altitude in yards. For any baseline literally any baseline, just multiply the number on the altitude scale by b/150. The variable b=the baseline length. The result will be the altitude in the same units of distance used to measure the baseline. This method should not be used in official competition, because due to possible deviations in the horizontal between the rocket and tracker caused by the wind, it's error prone. Another source of error is sloping or uneven ground between tracker and launch pad.

Jonathan Chambonneau

Got all that? Good, because there's going to be a pop quiz at the next meeting. Ed.

June Club Launch

June Club Launch








Sci-Fi Classics
2001 A Space Odyssey / U.S.S. Discovery (1968)